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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,620	07/31/2002	Sudipta Mukhopadhyay	RD-29161	8845

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GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
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NISKAYUNA, NY 12309

EXAMINER	
HUNG, YUBIN	

ART UNIT	PAPER NUMBER
2625	

DATE MAILED: 02/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/064,620	MUKHOPADHYAY ET AL.	
	Examiner	Art Unit	
	Yubin Hung	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 January 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 July 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Amendment/Argument

1. This is in response of amendment filed 01/04/2006, which has been entered.

2. Claims 1-31 are still pending.

3. Applicant's amendment to claim 30 fails to overcome the previously made objection to the specification. Specifically, as amended the claim is still directed to a medium "for" a certain purpose (see line 1) and therefore any machine-readable medium capable of storing computer program code reads on the claim. **Therefore, the objection to the specification is maintained. [For examination purpose, "medium for storing" will be interpreted as "medium storing."]**

4. Applicant's arguments filed 01/04/06 have been fully considered but they are not persuasive; see below.

5. In remarks Applicant argued in substance:

5.1 *that the references cited for rejection do not disclose, teach or suggest (1) "span of interest obtained from an acquired imaging sequence (P. 7, 2nd paragraph, lines 1-2); (2) "at least one frame of interest" and (3) "plurality of frames of interest" (P. 7, 2nd paragraph, lines 2-3); (4) "lossless compression" (P. 7, 2nd*

paragraph, lines 3-4); (5) "lossy compression" (P. 7, 2nd paragraph, line 4); (see also P. 7, last paragraph, lines 6-7)

However, regarding (1) and (2): per Applicant's definitions in paragraph 0017, page 5, an *image* can be a 2-D distribution of pixels (e.g., a single 2-D still image or a subset thereof) (lines 8-9) and a *span of interest* can consist of as little as one 2-D image, or even a subset thereof (lines 11-13). The smoothed difference image (Fig. 2, refs. 32 & 55) of Ransford therefore can be considered as a span of interest. Additionally, the imaging sequence comprising all images captured and transmitted in Scorse [Fig. 2, the loop defined by the label "B"] also constitutes a span of interest comprising multiple (2-D) images; therefore Scorse also teaches (3) "selecting plurality of frames of interest."

Regarding (4) and (5), the rejection of claim 1 in the Office action mailed 10/05/2005 noted that it is well known to one of ordinary skill in the art that compression algorithms include both lossy and lossless. For example, see McGary (US 5,521,634), which discloses losslessly compressing an area of interest (i.e., a target box) [Fig. 1, refs. 12, 14 & 20; Fig. 3, refs. 38 & 42; Col. 2, line 53-Col. 3, line 3; Col. 3, lines 32-36; Col. 5, lines 11-24]. Additionally, Fig. 4, refs. 54 and 56 of Yang et al. (US 5,926,611) also discloses using either lossless or lossy compression, depending the variation of the targeted areas. Whether a lossless one or a lossy one is chosen is a design choice involving tradeoff

between fidelity and data size. Note that both McGary and Yang were cited, but not relied upon for rejection, in the previous Office action.

Claim Rejections - 35 USC § 103

(From Office action mailed 10/05/2005)

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-8, 10, 12-14, 23-26, 28, 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ransford et al. (EP 479,563 A2) and Scorse et al. (US 5,128,776).

8. Regarding claim 1, and similarly claims 12, 24, 30 and 31, Ransford discloses

- selecting a portion of an image (in a span of interest) obtained from an acquired imaging sequence; applying lossless compression to the portion of the image and obtaining a compressed image (sequence); applying decompression to the compressed image and obtaining therefrom an analytically relevant image (sequence)
  [Fig. 2, refs. 16, 18, 36-50; Col. 11, lines 8-28; Col. 14, line 56-Col. 15, line 15; Col. 15, lines 54-58. Note that it is well known to one of ordinary skill in the art that conventional compression algorithms include both lossy and lossless]

Ransford does not expressly disclose that the image is from a span of interest and that compressed/decompressed image sequences are generated.

However, Scorse suggests compressing a set of images (i.e., a span of interest) to obtain a compressed image sequence. [Fig. 1, ref. 14, 34; Fig. 2, block labeled "Select Image(s) to Xmit."]

Ransford and Scorse are combinable because they are from the same field of endeavor of image compression/decompression.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify Ransford with the teaching of Scorse by applying the compression/decompression method to a span of images. The motivation would have been because typically multiple X-ray images of a patient is taken and therefore are transmitted [Ransford: Col. 16, lines 1-7] together (perhaps only a subset) to a recipient.

Therefore, it would have been obvious to combine Scorse with Ransford to obtain the invention as specified in claim 1.

9. Regarding claims 2-8 and 10, and similarly claims 25, 26 and 28, the combined invention of Ransford (R) and Scorse (S) further discloses

(claims 2 & 26) wherein the portion of the image is a plurality of frames in a span of interest
[S: Fig. 2, block labeled "Select Image(s) to Xmit"]
(claims 3 & 25) wherein the portion is at least one frame in a span of interest
[S: Col. 4, line 17]
(claim 4) archiving the analytically relevant image sequence
[S: Fig. 1, ref. 34, 38; Col. 4, lines 20-22]
(claim 5) wherein selecting the portion in the span of interest comprises having a user select option for selecting the portion of image

[R: Fig. 2, ref. 16; Col. 11, lines 8-28. Also S: Fig. 1, ref. 18; Col. 4, lines 35-37]

(claim 6) wherein the user select option comprises segmenting an identifiable anatomy of a patient
[R: Col. 11, lines 28-32]

(claim 7) wherein the user select option comprises manually marking frames of interest
[S: Fig. 1, ref. 18; Col. 4, lines 35-37]

(claim 8) wherein the user select option comprises sketch-gripping an image boundary
[R: Col. 11, lines 28-32]

(claims 10 & 28) wherein selecting the portion of the image in the span of interest comprises selecting the portion of image in a time sequence
[S: Fig. 2, block labeled "Select Image(s) to Xmit," (time sequence)]

10. Regarding claim 13, Ransford further discloses

- wherein the imaging device is a medical imaging device selected from a magnetic resonance imaging system, a computed tomography system, an x ray system, an x ray angiogram system and an ultrasound system
[Col. 11, lines 28-32]

11. Claim 14 is similarly analyzed and rejected per the analyses of claims 12 & 13 above.

12. Claim 23 is similarly analyzed and rejected as per the analysis of claim 1 and additionally the fact the lossy compression methods are well-known conventional compression methods. [For example, as admitted in paragraph 0002 of the application.]

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13. Claims 9, 11, 17-18, 27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ransford et al. (EP 479,563 A2) and Scorse et al. (US 5,128,776) as

applied to claims 1-8, 10, 12-14, 23-26, 28, 30 and 31 above, and further in view of Chui et al. (US 5,841,473).

14. Regarding claim 17, the combined invention of Ransford and Scorse discloses

- selecting a plurality of frames of interest (obtained from an MRI device); applying lossless compression to the plurality of frames of interest and obtaining therefrom a compressed image sequence; applying decompression to the compressed image sequence and obtaining therefrom an analytically relevant image sequence
[Per the analysis of claim 1]

The combined invention of Ransford and Scorse does not expressly disclose that the frames are obtained from an MRI device.

However, Chui discloses compressing MRI image sequences [Col. 6, lines 36-44].

The combined invention of Ransford and Scorse is combinable with Chui since they have aspects that are from the same field of endeavor of image compression.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Ransford and Scorse with the teaching of Chui by compressing MRI image sequences. The motivation would have been because such images are frequently acquired in medical procedures and the reduction of their size (by compression) can save the storage cost.

Therefore, it would have been obvious to combine Chui with Ransford and Scorse to obtain the invention as specified in claim 17.

15. Regarding claims 9, 11 and similarly claims 27 and 29, note that the combined invention of Ransford and Scorse discloses all limitations of their parent, claims 1 and 24. In addition, the MRI image sequence disclosed in Chui [Col. 6, lines 36-44] is a space sequence and, since each image is taken at a different time, is by definition also a time sequence. Further, Scorse discloses selecting frames from a time sequence [Fig. 2, block labeled "Select Image(s) to Xmit"].

16. Regarding claim 18, note that the MRI image sequence disclosed in Chui is a space sequence. In addition, per the analysis of claim 7, Scorse discloses manual selection of the frames of interest.

***

17. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ransford et al. (EP 479,563 A2) and Scorse et al. (US 5,128,776) as applied to claims 1-8, 10, 12-14, 23-26, 28, 30 and 31 above, and further in view of Flower et al. (US 6,351,663).

18. Regarding claim 15, Ransford and Scorse disclose

- selecting a plurality of frames of interest (obtained from the x-ray angiogram); applying lossless compression to the plurality of frames of interest and obtaining therefrom a compressed image sequence; applying

decompression to the compressed image sequence and obtaining therefrom an analytically relevant image sequence
[Per the analysis of claim 1]

Ransford and Scorse do not expressly disclose that the frames are obtained from an x-ray angiogram and that selecting the plurality of frames of interest comprises selecting at least two time instances and capturing the frames of interest between the two time instances.

However, Flower discloses capturing x-ray angiograms (i.e., image frames) and comparing a series of angiograms over a time period (i.e., between two time instances) for diagnostic purpose [Col. 1, lines 34-60].

The combined invention of Ransford and Scorse is combinable with Flower since they have aspects that are from the same field of endeavor of image acquisition.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Ransford and Scorse with the teaching of Flower by using x-ray angiograms over a time period (for diagnostic purpose). The motivation would have been because such images are frequently acquired in medical procedures and the reduction of the size (by compression) of the subset of those images (useful for diagnostic purpose) can save the storage cost.

Therefore, it would have been obvious to combine Flower with Ransford and Scorse to obtain the invention as specified in claim 15.

19. Regarding claim 16, it would have been obvious to one of ordinary skill in the art at the time of the invention to select one time instance when a dye appears and a second time instance when the dye disappears since only images captured during the presence of the dye are useful (as column 1, lines 44-48 of Flower clearly suggests).

***

20. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ransford et al. (EP 479,563 A2), Scorse et al. (US 5,128,776) and Chui et al. (US 5,841,473) as applied to claims 9, 11, 17, 18, 27 and 29 above, and further in view of Reinsch (US 5,134,661).

21. Regarding claim 19, the combined invention of Ransford, Scorse and Chui discloses all limitations of its parent, claim 17.

The combined invention of Ransford, Scorse and Chui does not expressly disclose that the frames of interest in a space sequence are automatically selected using edge detection.

However, Reinsch suggests using edge detection to select areas of interest. [Abstract: lines 1-9.]

The combined invention of Ransford, Scorse and Chui is combinable with Reinsch since they have aspects that are from the same field of endeavor of image processing.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Ransford, Scorse and Chui with the teaching of Reinsch by using edge detection to select areas of interest. The motivation would have been because edge detection produces edge points that can be processed to obtain the contours of regions of interest.

Therefore, it would have been obvious to combine Reinsch with Ransford, Scorse and Chui to obtain the invention as specified in claim 19.

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22. Claims 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ransford et al. (EP 479,563 A2) and Scorse et al. (US 5,128,776) as applied to claims 1-8, 10, 12-14, 23-26, 28, 30 and 31 above, and further in view of Koo et al. (US 5,846,203).

23. Regarding claim 20, Ransford and Scorse disclose

- selecting at least one frame of interest (obtained from the ultrasound device); applying lossless compression to the to the least one frame of interest and obtaining a compressed image sequence; applying decompression to the compressed image sequence and obtaining therefrom an analytically relevant image sequence
[Per the analysis of claim 1]

Ransford and Scorse do not expressly disclose that the frame of interest is acquired by an ultrasound device.

However, Koo suggests using an ultrasound device. [Figs. 1 & 2A; Col. 4, lines 11-15.]

The combined invention of Ransford and Scorse is combinable with Koo since they have aspects that are from the same field of endeavor of medical image processing (specifically, X-ray and ultrasound images).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the combined invention of Ransford and Scorse with the teaching of Koo by processing ultrasound images. The motivation would have been because ultrasound is increasingly used as a noninvasive method for examining the interior body matter of a patient.

Therefore, it would have been obvious to combine Koo with Ransford and Scorse to obtain the invention as specified in claim 20.

24. Regarding claims 21 and 22, Koo further discloses that the ultrasound images of tissues are typically fan-shaped [Col. 4, lines 11-15]; in addition, Ransford [column 11, lines 12-21] discloses

(claim 21) wherein selecting the at least one frame of interest comprises selecting a fan shaped image using automatic means, or
(claim 22) wherein selecting the at least one frame of interest comprises selecting a fan shaped image using manual means

Conclusion and Contact Information

25. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Dolazza (US 4,573,035) – discloses a system that acquires and compresses a sequence of X-ray images
- Cantoni (US 6,115,486) – discloses a system that acquires and compresses a sequence of X-ray images

26. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yubin Hung whose telephone number is (571) 272-7451. The examiner can normally be reached on 7:30 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Yubin Hung
Patent Examiner
February 3, 2006

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